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Subject: Interconnection System Impact Restudy/Interconnection Facilities Study Report
GWF Tracy Combined Cycle Power Plant Project (08-AFC-7)

On behalf of the GWF Energy LLC., please find attached 4 copies and one original of the Interconnection System Impact Restudy/Interconnection Facilities Study Report.

Please call me if you have any questions.

Sincerely,

CH2M HILL

Jerry Salamy
Senior Project Manager

c: Proof of Service List

Interconnection System Impact Restudy / Interconnection Facilities Study Report

GWF Energy LLC

GWF Tracy Project

Final Report

(Revision 1)

California ISO

Your Link to Power

April 17, 2009

This study has been completed in coordination with Pacific Gas & Electric per the Large Generator Interconnection Procedures

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1. Executive Summary

GWF Energy LLC, an Interconnection Customer (IC), has requested the California Independent System Operator Corporation (CAISO) to perform an Interconnection System Impact Re-study / Interconnection Facilities Study (ISIR / IFAS) for their GWF Tracy Project (Project). The Project adds one steam turbine generator to the existing two gas turbine generators to form a combined cycle (2X1) plant. The new steam turbine generator is rated for a gross output of 154.7 MW. With 9.7 MW of plant auxiliary load, the maximum output to the CAISO Controlled Grid is 145 MW. The proposed Commercial Operation Date of the Project is April 1, 2013. The Point of Interconnection (POI) is at Pacific Gas & Electric Company's (PG&E's) Schulte Switching Station 115 kV bus in San Joaquin County. In addition, the Tesla – Manteca 115 kV Line needs to be looped into Schulte Switching Station (Schulte SW ST).

CAISO and PG&E had performed an Interconnection System Impact Study (ISIS) for the Project and issued a final report on May 19, 2008 that provided an analysis of the system impacts.

In accordance with the Federal Energy Regulatory Commission's (FERC) Large Generation Interconnection Procedures (LGIP), the IC, CAISO, and PG&E agreed that an Interconnection Facilities Study (IFAS) was required to specify and estimate the cost of equipment needed to physically and electrically interconnect the Project to the CAISO Controlled Grid.

Based on the Generator Interconnection Process Reform (GIPR) filed with FERC by the CAISO on May 15, 2008, some generation projects that were higher than this Project in the CAISO Generation queue were placed in "Transition Cluster" to be evaluated as a "group" starting in November 2008. These higher queued projects were required to be removed from the base cases that were being used for ongoing studies such as for this Project. Therefore, the IC, CAISO and PG&E agreed to conduct an Interconnection System Impact Restudy (ISIR), to re-evaluate the impacts of this Project on the CAISO Controlled Grid after removing the selected higher queued projects from the Power Flow base cases. Also, to expedite interconnection study, the ISIR was combined with the IFAS to create one combined report. This combined ISIR / IFAS report provides:

1. Updated Power flow results ***without*** Transition Cluster projects in the base cases.

2. Work scope and cost estimates for the Interconnection Facilities necessary to interconnect the Project to the CAISO Controlled Grid.

3. Work scope and cost estimates for the Network Upgrades necessary to mitigate the impacts of the Project under various system conditions.

To determine the impacts of the Project on the CAISO Controlled Grid, the following full-loop base cases were used:

- 2013 Summer Peak.

- 2013 Summer Off-Peak.
- 2013 Spring Peak.

The studies performed included:

- Steady State Power Flow Analyses.
- Transmission Line Evaluation.
- Substation Evaluation.
- Land/Environment Evaluation.

Steady State Power Flow Analyses concluded that the interconnection of the Project to the CAISO Controlled Grid causes the following new transmission facilities to become overloaded:

- Vierra - Tracy - Kasson 115 kV Line section between Cross Rd Jct and Kasson Jct 2 (Category "B" emergency overload).

  The work scope and cost estimate for reconductoring this transmission line is provided in this ISIR / IFAS report.

- Schulte SW ST – Kasson - Manteca 115 kV Line section between Kasson Jct. 1 - Schulte and Owens Tap 1 (Category "B" emergency overload).

  The work scope and cost estimate for installing Special Protection Systems (SPS) to mitigate this overload is provided in this ISIR / IFAS report.

The Project also exacerbates the following pre-project overloads:

- Warnerville - Wilson 230 kV Line (Normal, Category "B" and Category "C" emergency overloads).
- Vierra - Tracy - Kasson 115 kV Line section between Cross Rd Jct and Tracy (Category "C" emergency overload).
- Schulte SW ST - Lammers 115 kV Line section between Schulte SW ST and Owens Tap 1 (Category "B" and Category "C" emergency overloads).
- Kasson – Louise 60 kV Line section between Kasson and Mossdale Sw (Category "C" emergency overload).
- Kasson 115/60 kV Transformer Bank # 1 (Category "C" emergency overload).
- Manteca – Louise 60 kV Line section between Louise Jct. and Manteca (Category "C" emergency overload).

- Tesla – Salado – Manteca 115 kV Line section between Manteca and Ingraham Creek (Category "C" emergency overload).

- Tesla – Tracy 115 kV Line (Category "C" emergency overload).

- Tesla – Westley 230 kV Line (Category "C" emergency overload).

The pre-project overloads are caused by generation projects that have higher queue position than this project. Those higher queued projects are responsible to mitigate the above overloads. However, if any of the higher queued projects did not materialize or the mitigation did not cover the overload contribution from this Project, the IC may be responsible for mitigating such overloads.

The non-binding construction schedule to engineer and construct the facilities is approximately 18-24 months from the signing of the Large Generator Interconnection Agreement (LGIA).

The non-binding cost estimate of Interconnection Facilities[1] to interconnect the project would be approximately **$650,000** exclusive of ITCC[2].

The non-binding cost estimate for the Network Upgrades[3] to interconnect the project would be approximately **$8.3 million**.

The total non-binding cost estimate to interconnect the Project to the CAISO Controlled Grid is about **$9 million** excluding ITCC.

2. Project and Interconnection Information

Figure 2-1 provides the map for the Project and the transmission facilities in the vicinity. Figure 2-2 shows the conceptual single line diagram of the Project.

[1] The transmission facilities necessary to physically and electrically interconnect the Project to the CAISO Controlled Grid at the point of interconnection.
[2] Income Tax Component of Contribution (currently @ 22%)
[3] The transmission facilities, other than Interconnection Facilities, beyond the point of interconnection necessary to physically and electrically interconnect the Project safely and reliably to the CAISO Controlled Grid

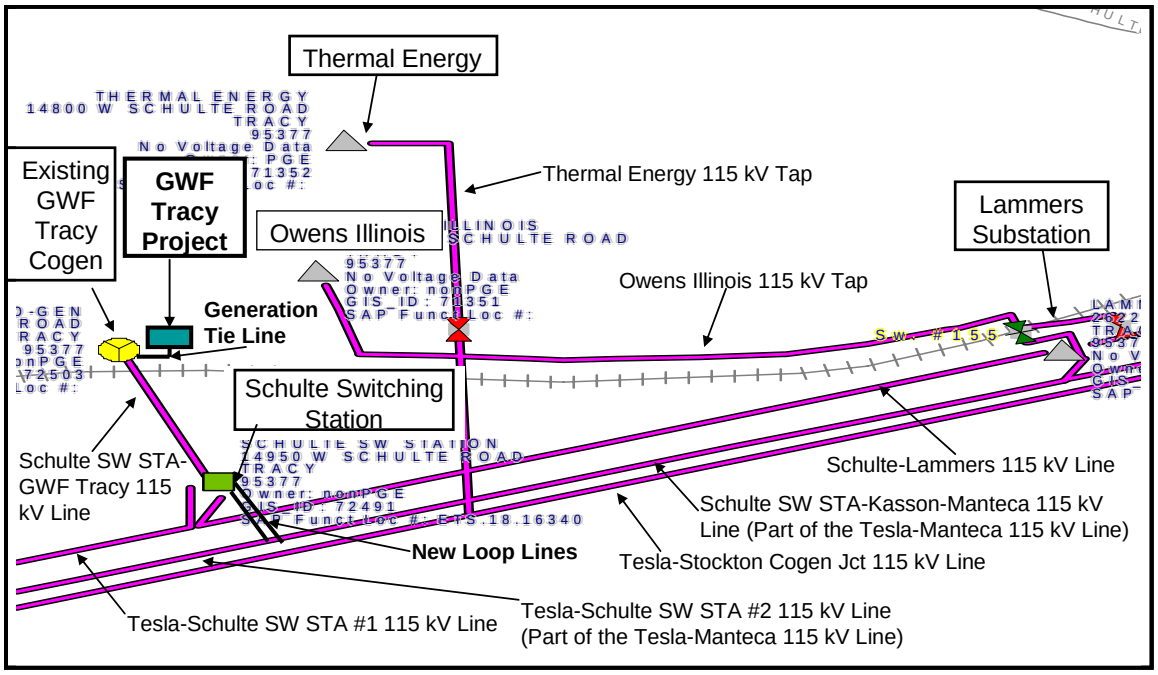

Figure 2-1 Map of the Project

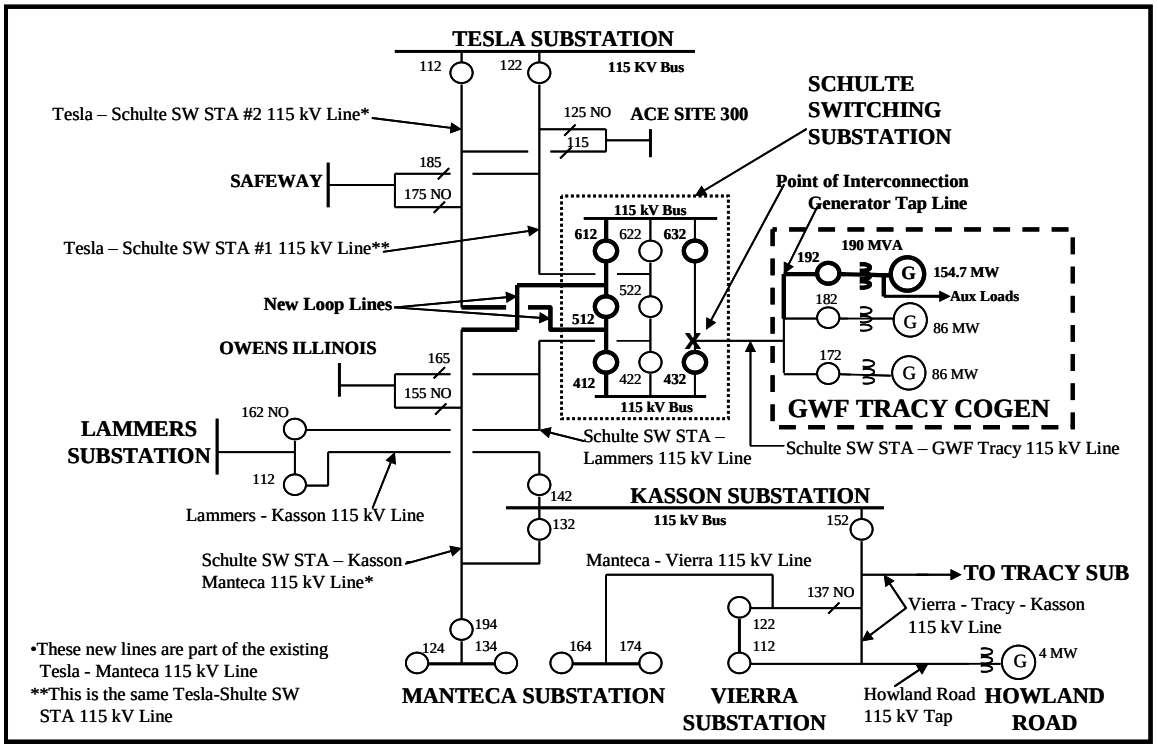

Figure 2-2: Conceptual One-Line Diagram

3. Study Assumptions

Under the direction of CAISO, PG&E conducted the ISIR / IFAS using the following assumptions:

1. The Project consists of one steam turbine generator rated for 154.7 MW. With a total plant auxiliary load of 9.7 MW, the net output to the CAISO Controlled Grid is 145 MW.

2. The expected Commercial Operation Date of the Project is April 1, 2013.

3. The Project uses one step-up transformer. It is a three-phase 18/115 kV transformer rated for 190 MVA @ 65 degree C temperature rise with an impedance of 8.7% at 190 MVA base.

4. The IC will engineer, procure, construct, own, and maintain its project facility including the generator tap line. The generator tap line from the Project to the existing GWF Tracy Peaker Switchyard is about 0.14 miles with 1431 kcmil "Bobolink" ACSS conductors.

5. PG&E will engineer, procure, construct, own, and maintain the loop lines (from the Tesla – Manteca 115 kV Line to Schulte Switching Station about 1000' in length). The conductor size of loop line is the same as the Tesla – Manteca 115 kV Line or equivalent. PG&E will modify the 115 kV bus at Schulte Switching Station with a breaker and a half (BAAH) configuration to accommodate the new loop lines. After looping, the Tesla – Manteca 115 kV Line will become the new Tesla-Schulte SW ST #1 115 kV Line and the Schulte SW ST-Kasson-Manteca 115 kV Line.

4. Power Flow Study Base cases

Three power flow base cases were used to evaluate the transmission system impacts of the Project. While it is impractical to study all combinations of system load and generation levels during all seasons and at all times of the day, these three base cases represented extreme loading and generation conditions for the study area.

CAISO and PG&E cannot guarantee that the Project can operate at maximum rated output 24 hours a day, year round, without adverse system impacts, nor can the CAISO and PG&E guarantee that the Project would not have adverse system impacts during the times and seasons not studied in the ISIR / IFAS.

The following power flow base cases were used for the analysis in the ISIR / IFAS:

- **2013 Summer Peak Full Loop Base Case:**

  Power flow analysis were performed using PG&E's 2013 summer peak full loop base case (in General Electric Power Flow format). This base case

was developed from PG&E's 2007 base case series. It has a 1-in-10 year heat wave load forecast for PG&E's Sacramento, Sierra, Stockton, and Stanislaus areas.

- **2013 Spring Peak Full Loop Base Case:**

  Power flow analysis was performed using the 2013 spring peak full loop base case to evaluate the potential congestion on transmission facilities under reduced load and increased hydro generation levels during a typical spring season. Typical spring season loads were applied in this spring peak full loop base case. As an aggregate, the PG&E system load in the spring case is about 70% of the summer peak load. However, the spring 2013 loads in Sacramento, Stockton, Stanislaus, and Sierra are about 50% of the summer peak loads. Hydro generators were modeled at very high levels which is typical in the spring season.

- **2013 Summer Off-Peak Full Loop Base Case:**

  Power flow analysis was performed using the 2013 summer off peak full loop base case to evaluate the potential congestion on transmission facilities during the lightest loading conditions of the year. The summer 2013 off peak loads in Sacramento, Stockton, Stanislaus, and Sierra are about 30% - 35% of the summer peak loads. The rest of the PG&E system loads were modeled as 2013 Spring Peak loads. This base case was used to evaluate single element contingencies only on PG&E's 60 kV through 230 kV systems.

These base cases modeled all approved PG&E transmission reliability projects that would be operational by 2013. These base cases also modeled all proposed applicable generation projects that would be operational by 2013. However, some generation projects that are electrically far from the proposed project were either turned off or modeled with reduced generation to balance the loads and resources in the power flow model. The major generation projects included are shown in Attachment 1 of Appendix A.

5. Study Criteria Summary

The CAISO Controlled Grid Reliability Criteria which incorporate the Western Electricity Coordinating Council (WECC) and the North American Electric Reliability Corporation (NERC) planning criteria were used to evaluate the impact of the Project on the CAISO Controlled Grid.

5.1 Steady State Study Criteria – Normal Overloads

Normal overloads are those that exceed 100 percent of normal ratings. The CAISO Controlled Grid Reliability Criteria requires the loading of all transmission system facilities be within their normal ratings.

5.2 Steady State Study Criteria – Emergency Overloads

Emergency overloads are those that exceed 100 percent of emergency ratings. The emergency overloads refer to overloads that occur during single element contingencies (Category "B") and multiple element contingencies (Category "C").

6. Steady State Power Flow Study and Results

6.1 Contingencies

The Category "B" and Category "C" contingencies used in this analysis are provided in Appendix B. The single (Category "B") and selected multiple (Category "C") contingencies include the following outages:

6.1.1 Category "B"

- All single generator outages within the study area
- All single (60 - 230 kV) transmission circuit outages within the study area
- All single (60 - 230 kV) transformer outages within the study area
- Selected overlapping single generator and transmission circuit outages for the transmission lines and generators within the study area

6.1.2 Category "C"

- Selected bus (60-230 kV) outages within the study area
- Selected outages caused by selected breaker failures (excluding bus tie and sectionalizing breakers) at the same above bus section
- Selected combination of any two-generator/transmission line/transformer outages (except ones included above in Category "B") within the study area
- Selected outages of double circuit tower lines (60-230 kV) within the study area

6.2 Study Results

Overloads caused by the Project are detailed in Appendix C, and overload plots are shown in Appendix D. The worst overloads for each facility under

normal and contingency conditions are summarized in Tables 6-1, 6-2, and 6-3.

6.2.1 Normal Overloads (Category "A")

Under projected 2013 summer peak conditions the Project exacerbates one (1) pre-project normal overload. No normal overloads are found under projected 2013 summer off peak and spring peak conditions. The Category "A" normal overload is summarized in Table 6-1. The pre-project overloads are shown shaded in the table.

Table 6-1: Normal Overloads

Over Loaded Component	Rating (Amps / MVA)	Pre- Project Loading (Amps | %Rating)		Post-Project Loading (Amps | %Rating)		% Change from Pre-Project Loading
2013 Summer Peak						
Warnerville - Wilson 230 kV Line	675	746	111%	767	114%	3%

6.2.2 Emergency Overloads (Category "B")

Under projected 2013 summer peak conditions the Project causes two (2) new overloads and exacerbates three (3) pre-project Category "B" emergency overloads. Under projected 2013 summer off-peak conditions the Project causes one (1) new Category "B" emergency overload. Under projected 2013 spring peak conditions the Project causes no new Category "B" emergency overload. The Category "B" emergency overloads are summarized in Table 6-2. The pre-project overloads are shown shaded in the table.

Table 6-2: Category "B" Emergency Overloads

Over Loaded Component	Contingency	Rating (Amps)	Pre- Project Loading (Amps |%Rating)		Post-Project Loading (Amps |%Rating)		% Change from Pre-Project Loading
2013 Summer Peak							
Vierra - Tracy - Kasson 115 kV Line (Cross Rd Jct - Kasson Jct 2)	Schulte SW ST - Kasson - Manteca 115 kV Line and Stanislaus Powerhouse	884	858	97%	917	104%	7%
Schulte SW ST - Kasson - Manteca 115 kV Line (Kasson Jct 1 - Schulte)	Schulte SW ST - Lammers 115 kV Line	1125	833	74%	1159	103%	29%
Prescott - Woodland MID 69 kV Line*	Bellota - Warnerville 230 kV Line and Melones 1	423	510	121%	516	122%	1%
	Bellota - Warnerville 230 kV Line	423	497	118%	503	119%	1%
Schulte SW ST - Lammers 115 kV Line	Schulte SW ST - Kasson - Manteca 115 kV Line and Stanislaus Powerhouse	1125	1238	105%	1334	119%	14%
	Schulte SW ST - Kasson - Manteca 115 kV Line	1125	1223	99%	1241	110%	11%

Over Loaded Component	Contingency	Rating (Amps)	Pre- Project Loading (Amps |%Rating)		Post-Project Loading (Amps |%Rating)		% Change from Pre-Project Loading
	Schulte SW ST - Kasson - Manteca 115 kV Line and GWF Tracy 1	1125	1000	89%	1179	105%	16%
Warnerville - Wilson 230 kV Line	Bellota - Melones 230 kV Line and Melones 1	793	926	117%	952	120%	3%
	Bellota - Melones 230 kV Line	793	815	103%	841	106%	3%
	Los Banos - Westley 230 kV Line	793	779	98%	805	102%	4%
	Valley Springs 230/60 kV Bank 1	793	778	98%	800	101%	3%
2013 Summer Off Peak							
Warnerville - Wilson 230 kV Line	Bellota - Melones 230 kV Line and Melones 1	793	787	99%	811	102%	3%

* This is not a PG&E owned transmission line.

6.2.3 Emergency Overloads (Category "C")

Under projected 2013 summer peak conditions the Project exacerbates thirteen (13) pre-project Category "C" emergency overloads. Under projected 2013 summer off peak conditions the Project causes two (2) new Category "C" emergency overloads, however, these lines are also found overloaded pre-project in Summer peak conditions. Under projected 2013 spring peak conditions the Project exacerbates three (3) pre-project Category "C" emergency overloads. The Category "C" emergency overloads are summarized in Table 6-3. The pre-project overloads are shown shaded in the table.

Table 6-3: Category "C" Emergency Overloads

Over Loaded Component	Contingency	Rating (Amps)	Pre- Project Loading (Amps |%Rating)		Post-Project Loading (Amps |%Rating)		% Change from Pre-Project Loading
2013 Summer Peak							
Kasson - Louise 60 kV Line (Kasson – Mossdale Sw)	Schulte SW ST - Kasson - Manteca and Manteca - Vierra 115 kV Lines	385	443	115%	488	127%	12%
Kasson 115/60 kV Bnak 1	Schulte SW ST - Kasson - Manteca and Manteca - Vierra 115 kV Lines	91 MVA	91 MVA	100%	96 MVA	106%	6%
Manteca - Louise 60 kV Line (Louise Jct - Manteca)	Schulte SW ST - Kasson - Manteca and Manteca - Vierra 115 kV Lines	327	380	116%	425	130%	14%
Prescott - Woodland MID 69 kV Line	Bellota 230 kV Bus Section 2	423	519	123%	525	124%	1%
Schulte SW ST - Lammers 115 kV Line	Schulte SW ST - Kasson - Manteca and Tesla - Salado - Manteca 115 kV Lines	1125	1242	110%	1388	123%	13%
	Tesla 115 kV Bus Section 2	1125	864	77%	1198	107%	30%

Over Loaded Component	Contingency	Rating (Amps)	Pre- Project Loading (Amps |%Rating)		Post-Project Loading (Amps |%Rating)		% Change from Pre-Project Loading
Tesla - Salado - Manteca 115 kV Line (Manteca - Ingraham Creek)	Schulte SW ST - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	326	595	182%	608	186%	4%
	Schulte SW ST - Kasson - Manteca and Manteca - Vierra 115 kV Lines	326	552	169%	561	172%	3%
	Kasson – Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	326	515	158%	527	162%	4%
Tesla – Tracy 115 kv Line (Tesla – Tracy Jct.)	Schulte SW ST - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	1125	1590	141%	1611	143%	2%
	Kasson - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	1125	1329	118%	1350	120%	2%
Tesla - Tracy 115 kV Line (Tracy Jct - Tracy)	Schulte SW ST - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	974	1571	161%	1592	163%	2%
	Kasson - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	974	1311	135%	1332	137%	2%
Tesla - Westley 230 kV Line	Bellota - Q172 and Weber - Q172 230 kV Lines	1600	1768	110%	1787	112%	2%
	Bellota - Q172 and Bellota - Weber 230 kV Lines	1600	1653	103%	1674	105%	2%
Vierra - Tracy - Kasson 115 kV Line (Cross Rd Jct - Kasson Jct 2)	Schulte SW ST - Kasson - Manteca and Tesla - Salado - Manteca 115 kV Lines	884	958	108%	1005	114%	6%
Vierra - Tracy - Kasson 115 kV Line (Heinz - Tracy)	Schulte SW ST - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	612	1032	169%	1053	172%	3%
	Kasson - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	612	788	129%	808	132%	3%
Vierra - Tracy - Kasson 115 kV Line (Kasson Jct 2 - Heinz)	Schulte SW ST - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	603	1032	171%	1052	175%	4%
	Kasson - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	603	788	131%	808	134%	3%
Warnerville - Wilson 230 kV Line	Bellota 230 kV Bus Section 1	793	811	102%	837	106%	4%
	Lockeford 60 kV Bus	793	799	101%	820	103%	2%
	Stagg 60 kV Bus	793	783	99%	805	101%	2%
	Valley Springs 60 kV Bus	793	779	98%	800	101%	3%
2013 Summer Off Peak							
Vierra - Tracy - Kasson 115 kV Line (Heinz - Tracy)	Tesla – Schulte SW ST #1 and #2 115 kV Lines	613	296	48%	684	112%	64%

Over Loaded Component	Contingency	Rating (Amps)	Pre- Project Loading (Amps |%Rating)		Post-Project Loading (Amps |%Rating)		% Change from Pre-Project Loading
Vierra - Tracy - Kasson 115 kV Line (Kasson Jct 2 - Heinz)	Tesla – Schulte SW ST #1 and #2 115 kV Lines	603	296	49%	684	114%	65%
2013 Spring Peak							
Vierra - Tracy - Kasson 115 kV Line (Kasson Jct 2 - Heinz)	Schulte SW ST - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	603	628	104%	647	107%	3%
Tesla - Salado - Manteca 115 kV Line (Manteca - Ingraham Creek)	Schulte SW ST - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	326	356	109%	368	113%	4%
Tesla - Tracy 115 kV Line (Tracy Jct - Tracy)	Schulte SW ST - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	974	1036	106%	1055	108%	2%

7. Overload Mitigation

Mitigation alternatives have been developed for Category “A” (normal) and Category “B” contingency overloads identified in Section 6.

The preferred method to mitigate these normal as well as Category “B” emergency overloads is to re-conductor these overloaded lines with larger conductors. The alternative method to mitigate normal overloads is by generation curtailment. The alternative method to mitigate Category “B” overloads is to use Special Protection Systems (SPS) to drop generation if the SPS meets the CAISO Planning Standard. The ISIS only provides cost estimates for the re-conductoring alternative.

For CAISO Category “C” contingencies, the overloads may be mitigated by load shedding or generation dropping (according to WECC reliability criteria). PG&E or CAISO or both may require new generators to take part in and be responsible for the costs of operating procedures and/or SPS for Category “C” emergency overloads caused by the project. No new Category “C” overloads have been caused by the project hence no mitigation has been provided in the ISIR / IFAS.

Tables 7-1, 7-2 and 7-3 summarized the worst normal overloads, Category “B” emergency overloads and Category “C” emergency overloads from Tables 6-1, 6-2 and 6-3 respectively. The pre-project overloads are shown as shaded in the table.

Table 7-1: Worst Normal Overloads

Over Loaded Component	Rating (Amps / MVA)	Pre- Project Loading (Amps | %Rating)		Post-Project Loading (Amps | %Rating)		% Change from Pre-Project Loading	Mitigation
Warnerville - Wilson 230 kV Line	675	746	111%	767	114%	3%	7.1.1

Table 7-2: Worst Category "B" Emergency Overloads

Over Loaded Component	Contingency	Rating (Amps)	Pre- Project Loading (Amps |%Rating)		Post-Project Loading (Amps |%Rating)		% Change from Pre-Project Loading	Mitigation
Vierra - Tracy - Kasson 115 kV Line (Cross Rd Jct - Kasson Jct 2)	Schulte SW ST - Kasson - Manteca 115 kV Line and Stanislaus Powerhouse	884	858	97%	917	104%	7%	7.2.1
Schulte SW ST - Kasson - Manteca 115 kV Line (Kasson Jct 1 - Schulte)	Schulte SW ST - Lammers 115 kV Line	1125	833	74%	1159	102%	29%	7.2.2
Schulte SW ST - Lammers 115 kV Line	Schulte SW ST - Kasson - Manteca 115 kV Line and Stanislaus Powerhouse	1125	1238	105%	1334	119%	14%	7.3.1
Warnerville - Wilson 230 kV Line	Bellota - Melones 230 kV Line and Melones 1	793	926	117%	952	120%	3%	7.1.1

Table 7-3: Worst Category "C" Emergency Overloads

Over Loaded Component	Contingency	Rating (Amps)	Pre- Project Loading (Amps |%Rating)		Post-Project Loading (Amps |%Rating)		% Change from Pre-Project Loading	Mitigation
Kasson - Louise 60 kV Line (Kasson – Mossdale Sw)	Schulte SW ST - Kasson - Manteca and Manteca - Vierra 115 kV Lines	385	443	115%	488	127%	12%	7.4
Kasson 115/60 kV Bnak 1	Schulte SW ST - Kasson - Manteca and Manteca - Vierra 115 kV Lines	91 MVA	91 MVA	100%	96 MVA	106%	6%	7.4
Manteca - Louise 60 kV Line (Louise Jct - Manteca)	Schulte SW ST - Kasson - Manteca and Manteca - Vierra 115 kV Lines	327	380	116%	425	130%	14%	7.4
Prescott - Woodland MID 69 kV Line	Bellota 230 kV Bus Section 2	423	519	123%	525	124%	1%	7.4
Schulte SW ST - Lammers 115 kV Line	Schulte SW ST - Kasson - Manteca and Tesla - Salado - Manteca 115 kV Lines	1125	1242	110%	1388	123%	13%	7.4
Tesla - Salado - Manteca 115 kV Line (Manteca - Ingraham Creek)	Schulte SW ST - Lammers and Schulte Sw ST - Kasson - Manteca 115 kV Lines	326	595	182%	608	186%	4%	7.4
Tesla – Tracy 115 kV Line (Tesla – Tracy Jct.)	Schulte SW ST - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	1125	1590	141%	1611	143%	2%	7.4
Tesla - Tracy 115 kV Line (Tracy Jct - Tracy)	Schulte SW ST - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	974	1571	161%	1592	163%	2%	7.4
Tesla - Westley 230 kV Line	Bellota - Q172 and Weber - Q172 230 kV Lines	1600	1768	110%	1787	112%	2%	7.4
Vierra - Tracy - Kasson 115 kV Line (Cross Rd Jct - Kasson Jct 2)	Schulte SW ST - Kasson - Manteca and Tesla - Salado - Manteca 115 kV Lines	884	958	108%	1005	114%	6%	7.4

Over Loaded Component	Contingency	Rating (Amps)	Pre- Project Loading (Amps |%Rating)		Post-Project Loading (Amps |%Rating)		% Change from Pre-Project Loading	Mitigation
Vierra - Tracy - Kasson 115 kV Line (Heinz - Tracy)	Schulte SW ST - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	612	1032	169%	1053	172%	3%	7.4
Vierra - Tracy - Kasson 115 kV Line (Kasson Jct 2 - Heinz)	Schulte SW ST - Lammers and Schulte SW ST - Kasson - Manteca 115 kV Lines	603	1032	171%	1052	175%	4%	7.4
Warnerville - Wilson 230 kV Line	Bellota 230 kV Bus Section 1	793	811	102%	837	106%	4%	7.4

7.1 Overload Mitigation for Pre-project Normal Overloads

7.1.1 Warnerville – Wilson 230 kV Line

Limiting Factor		500 kcmil Hold-Cu @ 2 fps wind speed rating: 675 Amps Normal and 793 Amps Emergency	
Pre-project Normal Loading	***746 (111%)***	Post Project Normal Loading	***767 (114%)***
Pre-project Emergency Loading	***926 Amps (117%)***	Post-project Emergency Loading	***952 Amps (120%)***
Worst Contingency		Normal and Bellota - Melones 230 kV Line and Melones 1	
Overload Condition		2013 Summer Peak	

Solution: This line overload is a result of a generation project that has a higher queue position and an earlier online date. That project has been assigned the responsibility for mitigating this overload. Should that project not materialize or the mitigation provided by that project did not resolve the overload contributed by this Project, the IC may be responsible for mitigating this overload**.**

7.2 Overload Mitigation for New Category "B" Emergency Overloads

7.2.1 Vierra – Tracy – Kasson 115 kV Line (Cross Road – Kasson Jct 2)

Limiting Factor		715..5 Al @ 4 fps wind speed rating: 884 Amps Emergency	
Pre-project Emergency Loading	858 Amps (97%)	Post-project Emergency Loading	917 Amps (104%)
Worst Contingency		Schulte SW ST - Kasson - Manteca 115 kV Line and Stanislaus Powerhouse	
Overload Condition		2013 Summer Peak	

Solution: Re-conductor 2.5 miles of the Vierra – Tracy – Kasson 115 kV Line (Cross Road – Kasson Jct 2) with 477 kcmil ACSS or

equivalent conductors. The 477 kcmil ACSS conductors are rated for 1125 Amps emergency respectively @ 2 fps wind speed. Substation terminal equipment will also be upgraded to match or exceed the ampacity rating of the new conductors.

Alternative Solution: Reducing net output to 25 MW may also mitigate this overload.

7.2.2 Schulte SW ST - Kasson - Manteca 115 kV Line (Kasson Jct 1 - Schulte)

Limiting Factor		477 ACSS @ 2 fps wind speed rating: 1125 Amps Emergency	
Pre-project Emergency Loading	833 Amps (74%)	Post-project Emergency Loading	1159 Amps (103%)
Worst Contingency		Schulte Sw ST – Lammers 115 kV Line	
Overload Condition		2013 Summer Peak	

Solution: Reducing net output of the Project to 125 MW or lower will mitigate this overload. Based on discussion among the IC, PG&E and CAISO, the preferred mitigation method is to install SPS to reduce generation to 125 MW or lower when the above contingency occurs and the line is found overloaded. PG&E will provide a permissive signal for GWF Tracy to reduce generation to desired level.

Alternative Solution: Re-conductor 8.9 miles of the Schulte SW ST – Kasson - Manteca 115 kV Line (Kasson Jct. 1 – Schulte) with 795 kcmil ACSS or equivalent conductors. The 795 kcmil ACSS conductors are rated for 1517 amps @ 2 fps wind speed. Substation terminal equipment will also need to be upgraded to match or exceed the ampere rating of the new conductors.

Note: The Schulte – Manteca 115 kV Line was a part of the Tesla – Manteca 115 kV Line after looping into Schulte Station.

An Optional Interconnection Study was conducted to determine if this line can be re-rated for higher rating using 4 ft per second (fps) wind speed. The results indicated that this line **can not** be re-rated for any higher rating. A report was issued on March 23, 2009 that documents the study results.

7.3 Overload Mitigation for Pre-project Category "B" Emergency Overloads

7.3.1 Schulte SW ST - Lammers 115 kV Line

Limiting Factor		477 ACSS @ 2 fps wind speed rating: 1125 Amps Emergency	
Pre-project	***1238 Amps (105%)***	Post-project	***1334 Amps (119%)***

Emergency Loading		Emergency Loading	
Worst Contingency		Schulte SW ST - Kasson - Manteca 115 kV Line and Stanislaus Powerhouse	
Overload Condition		2013 Summer Peak	

Solution: This line overload is a pre-project overload, and PG&E Project T680B (Tesla Area 115 kV Re-conductoring Project) will re-conductor this section of the Schulte SW ST – Lammers 115 kV Line. The EDRO date for Project T680B is 2009.

7.3.2 Warnerville – Wilson 230 kV Line

See Section 7.1.1

7.4 Overload Mitigation for Pre-project Category "C" Emergency Overloads

Category "C" pre-project overloads are caused by generation projects that have higher queue position than this project. Those higher queued projects are responsible to mitigate those overloads. However, if any of the higher queued projects did not materialize or the mitigation did not cover the overload contribution from this Project, the IC may be responsible for mitigating such overloads.

8. Deliverability Assessment

In accordance with LGIP section 3.3.3 of the LGIP, Deliverability Assessment was performed to determine the qualified capacity of the Project from Resource Adequacy perspective. This study focuses on the ability of the system to accommodate output of the Project to the aggregate of load under the conditions when resources are needed the most such as during summer peak conditions when resource shortage is likely to happen.

As required by LGIP tariff language, deliverability results need to provide the following information of this Project regarding deliverability:

1) The Project capacity that can be deliverable without additional upgrades.

2) The upgrades needed for this Project to be fully deliverable (Delivery Upgrades) if the study results identify transmission limitations that prevent the Project from being fully deliverable.

The results are as follows:

8.1 Deliverability of the Project without Additional Upgrades

Full output of the Project, 145 MW, is deliverable without additional upgrades.

8.2 Delivery Upgrades

No Delivery Upgrades are required to support 100% delivery.

Deliverability Assessment results are posted on the CAISO website at the following location: (look under column A, Queue Position 268)

http://www.caiso.com/20a5/20a5c7c468530.xls

9. Interconnection Facilities Study Scope

The ISIR / IFAS provided cost estimates and work scope for: (1) Interconnection Facilities required to interconnect the Project to the CAISO Controlled Grid and (2) Network Upgrades required to mitigate the system impacts caused by the Project. The specific studies conducted in the ISIR / IFAS are:

Interconnection Facilities:

- Perform pre-parallel inspection, testing, SCADA, EMS setup, Maintenance, etc.
- Install necessary structure to re-terminate the existing GWF Tracy – Schulte 115 kV Line onto the new BAAH bay

Network Upgrades:

- Reconductor the Vierra - Tracy - Kasson 115 kV Line section between Cross Rd Jct and Kasson Jct 2
- Install SPS for the Schulte SW ST - Kasson - Manteca 115 kV Line section between Kasson Jct. 1 - Schulte and Owens Tap 1
- Extend two bays, install breaker-a-half (BAAH) scheme (total of 5 new 115 kV breakers) at Schulte Switching Station
- Construct loop lines form the Tesla – Manteca 115 kV Line and terminate at the new bay at Schulte Switching Station
- Install/upgrade protection scheme and telecommunication
- Provide telecommunication

10. Transmission Line Evaluation

10.1 Interconnection Facilities Work Scope

The Transmission Line Evaluation determined the Interconnection Facilities work scope for which the Project will be responsible. These include all

transmission line engineering, design, and construction activities from the Project up to the Point of Interconnection (POI). Since the IC will build the generator tap line, no transmission Interconnection Facilities work and cost estimate is given on the tap line by the ISIR / IFAS. Because of the newly installed BAAH bay at Schulte Switching Station (See 10.2 below), new transmission structure is required to re-terminate the existing GWF Tracy – Schulte 115 kV Line. The ISIR / IFAS provides such work scope.

10.2 Network Upgrades Work Scope

The Transmission Line Evaluation determined the Network Upgrades work scope for which the Project will be responsible. These include all transmission line engineering, design, and construction activities beyond the POI. The final Network Upgrades work scope will be determined after detailed design and engineering is completed. The work scope includes:

- Engineer and construct loop lines from the Tesla – Manteca 115 kV Line to Schulte Switching Station
- Reconductor the Vierra - Tracy - Kasson 115 kV Line section between Cross Rd Jct and Kasson Jct 2 (about 2.5 miles) with 477 kcmil ACSS conductors

11. Substation Evaluation

Substation work scope is detailed in Appendix E.

11.1 Interconnection Facilities Work Scope

The Substation Evaluation determined interconnection Facilities work scope for which the Project will be responsible. These include all substation engineering, design, and construction activities from the Project facility up to the POI. The final work scope will be determined after detailed design and engineering is completed. The work scope includes:

- Pre-parallel inspection, testing, SCADA, EMS setup, engineering support, etc.

11.2 Network Upgrades Work Scope

The Substation Evaluation determined the Network Upgrades work scope for which the Project will be responsible. These include all substation engineering, design, and construction activities beyond the POI. The final work scope will be determined after detailed design and engineering is completed. The work scope includes:

- Extend two bays at Schulte Switching Station

- Install five (5) 115 kV breakers in the two new bays (in BAAH configuration) at Schulte Switching Station
- Terminate the loop lines and re-terminate the existing GWF Tracy – Schulte 115 kV Line at the new bays
- Install/upgrade protection scheme and telecommunication
- Provide telecommunication

12. Land Services Evaluation

12.1 Interconnection Facilities Work Scope

The Land Services Evaluation determined Interconnection Facilities work scope for which the Project will be responsible. These activities include land engineering and real estate activities from the Project up to the POI. Since the IC will build the generator tie line, no Land Interconnection Facilities work is given by the ISIR / IFAS. .

12.2 Network Upgrades Work Scope

The Land Services Evaluation determined the Network Upgrades work scope for which the Project will be responsible. These activities include land engineering and real estate activities beyond the POI.

- Surveying, mapping, land or land rights acquisition activities required to assist reconductoring, and
- Preparing and filing the Notice of Construction (NOC) in compliance with General Order 131-D after the reconductoring engineering and EMF studies are completed. PG&E will require approximately two months for these activities. The General Order 131-D approval process is not within PG&E's scheduling control and is dependent upon intervener's interest.

13. Environmental Evaluation/Permitting

13.1 CPUC General Order 131-D

PG&E is subject to the jurisdiction of the California Public Utilities Commission (CPUC) and must comply with CPUC General Order 131-D (Order) on the construction, modification, alteration, or addition of all electric transmission facilities (i.e., lines, substations, switchyards, etc.). This includes facilities to be constructed by others and deeded to PG&E. In most cases where PG&E's electric facilities are under 200 kV and are part of a larger project (i.e., electric generation plant), the Order exempts PG&E from obtaining an approval from the CPUC provided its planned facilities have been included in the larger project's California Environmental Quality Act

(CEQA) review, the review has included circulation with the State Clearinghouse, and the project's lead agency (i.e., California Energy Commission) finds no significant unavoidable environmental impacts. PG&E or the project developer may proceed with construction once PG&E has filed notice with the CPUC and the public on the project's exempt status, and the public has had a chance to protest PG&E's claim of exemption. If PG&E facilities are not included in the larger project's CEQA review, or if the project does not qualify for the exemption, PG&E may need to seek approval from the CPUC (i.e., Certificate of Public Convenience and Necessity or Permit to Construct) taking as much as 18 months or more since the CPUC would need to conduct its own environmental evaluation (i.e., Negative Declaration or Environmental Impact Report).

PG&E recommends that the project proponent include PG&E facility work in its project description and application to the lead agency performing CEQA review on the project. The lead agency must consider the environmental impacts of the interconnection electric facility, whether built by the developer with the intent to transfer ownership to PG&E or to be built and owned by PG&E directly, and make a finding of no significant unavoidable environmental impacts from construction of those facilities. Once the project has completed the review process and the environmental document (i.e., Negative Declaration or Environmental Impact Report) finds no significant unavoidable environmental impacts from PG&E's work, PG&E would file an Advice Letter with the CPUC and publish public notice of the proposed construction of the facilities. The noticing process takes about 90 days if no protests are filed, but should be done as early as possible so that a protest does not delay construction. PG&E has no control over the time it takes the CPUC to respond when issues arise. If the protest is granted, PG&E may then need to apply for a formal permit to construct the project (i.e., Certificate of Public Convenience and Necessity or Permit to Construct). Facilities built under this procedure must also be designed to include consideration of electric and magnetic field (EMF) mitigation measures pursuant to PG&E "EMF Design Guidelines of New Electrical Facilities: Transmission, Substation and Distribution".

Please see Section III, in General Order 131-D. This document can be found in the CPUC's web page at:

http://www.cpuc.ca.gov/PUBLISHED/GENERAL_ORDER/589.htm

13.2 CPUC Section 851

Because PG&E is subject to the jurisdiction of the CPUC, it must also comply with Public Utilities Code Section 851. Among other things, this code provision requires PG&E to obtain CPUC approval of leases and licenses to use PG&E property, including rights-of-way granted to third parties for Interconnection Facilities. Obtaining CPUC approval for a Section 851 application can take several months, and requires compliance with the California Environmental Quality Act (CEQA). PG&E recommends that Section 851 issues be identified as early as possible so that the necessary application can be prepared and processed.

14. Cost and Construction Schedule Estimates

A non-binding good faith cost estimates for the interconnection of the Project is **$8,950,000** exclusive of ITCC. The cost responsibility breakdown is provided in the sections below. These costs have no associated degree of accuracy and are provided for informational purpose only.

14.1 Interconnection Facilities Cost

Table13-1 provides detailed Interconnection Facilities cost to interconnect the Project.

Table 13-1 Interconnection Facilities Cost

Substation Work at Customer's Substation		
Pre-parallel inspection, testing, SCADA/EMS setup, meters, etc.	$250,000	
Subtotal Substation Work		**$250,000**
Transmission Work		
Install necessary structure to re-terminate the GWF Tracy – Schulte 115 kV Line	$300,000	
Subtotal Transmission Work		**$300,000**
Building & Land Work		
Land engineering support and permitting activities	$100,000	
Subtotal Building & Land Work		**$100,000**
Total Interconnection Facilities Cost before ITCC		**$650,000**

14.2 Network Upgrades Cost

Table 13-2 provides detailed Network Upgrades cost to interconnect the Project.

Table 13-2 Network Upgrades Cost

Substation Work		
Adding two new BAAH bay at Schulte Switching Station	$5,400,000	
Relay work in Tesla, Kasson, Lammers, and Manteca substations	$500,000	
Install SPS for the Schulte SW ST – Kasson – Manteca 115 kV Line	$500,000	
Subtotal Substation Work		**$6,400,000**
Transmission Work		
Construct loop lines connecting the Tesla – Manteca 115 kV Line and Schulte Switching Station (about 0.5 circuit miles)	$400,000	
Re-conductor 2.5 miles Portion of the Vierra – Tracy – Kasson 115 kV Line	$1,200,000	
Subtotal Transmission Work		**$1,600,000**

Communications Work		
SCADA/EMS, programming, testing, screening at TOC and Switching Center	$200,000	
Subtotal Communications Work		**$200,000**
Building & Land Work		
Land engineering support and permitting activities	$100,000	
Subtotal Building & Land Work		**$100,000**
Total Network Upgrades Cost		**$8,300,000**

14.3 Construction Schedule Estimate

The non-binding construction schedule to engineer and construct the facilities based on the assumptions outlined in the ISIS is approximately 18-24 months from the signing of the Large Generator Interconnection Agreement (LGIA). This is based upon the assumption that the environmental permitting obtained by the IC is adequate for permitting all PG&E activities.

Note that if CPUC may require PG&E to obtain a Permit to Construct (PTC) or a Certificate of Public Convenience and Necessity (CPCN) for the tap line or any other work associated with the project, the project could require an additional one to two years to complete. The cost for obtaining any of this type of permitting is not included in the above estimates.

15. Restudy

The ISIR / IFAS were performed according to the assumptions shown in "Study Assumptions." If these assumptions are changed, a restudy according to the LGIP, may be required. The IC would be responsible for paying for any such restudy.

16. Standby Power

The ISIR / IFAS do not address any requirements for standby power that the Project may require. The IC should contact their PG&E Generation Interconnection Services representative regarding this service.

Note: The IC is urged to contact their PG&E Generation Interconnection Services representative promptly regarding standby service in order to ensure its availability for the Project's start up date.

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
COMMISSION OF THE STATE OF CALIFORNIA
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1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION
FOR THE *GWF TRACY COMBINED CYCLE POWER PLANT PROJECT*

Docket No. 08-AFC-7
PROOF OF SERVICE

(Revised 2/25/2009)

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DECLARATION OF SERVICE

I, Mary Finn, declare that on June 15, 2009, I served and filed copies of the attached Interconnection System Impact Restudy/Interconnection Facilities Study Report. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: **[http://www.energy.ca.gov/sitingcases/tracyexpansion/index.html]**. The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(C*heck all that Apply*)

For service to all other parties:

__✓__ sent electronically to all email addresses on the Proof of Service list;

__✓__ by personal delivery or by depositing in the United States mail at Sacramento, California with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses **NOT** marked "email preferred."

AND

For filing with the Energy Commission:

__✓__ **sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (preferred method);**

OR

_____ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 08-AFC-7
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

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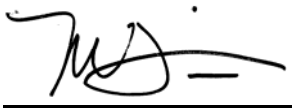
I declare under penalty of perjury that the foregoing is true and correct.



Mary Finn